

REMARKS

The claims in the application are now Claims 1-21. The fee for the excess number of claims is authorized to be charged to the deposit account. Claims 13-17 are withdrawn from further consideration under 37 CFR 1.142(b) as being directed to a non-elected invention.

EXTENSION OF TIME

The shortened statutory period was set to expire on June 31, 2004. The fee for a two-month extension is included so that the period for response will now expire on

AUGUST 31, 2004.

THE REJECTION UNDER 35 USC § 102

Claims 3 and 4 stand rejected under 35 USC § 102(b) as anticipated by Woellner (US 3,800,435). The Examiner states that '435 generates water spray by ejecting water under pressure from a nozzle opening with a gas flow along side the water flow. The Examiner notes that the ratio of gas flow to water velocity is in the range of 0.5 to 2 (citing column 7, lines 65-67).

Applicants' traverse this ground of rejection. The '435 reference relates to a method of cooling an elongated material, such as a strand material like insulated wire. In contrast, the present invention is directed to a method of removing soil from a hard surface by ejecting water under pressure and entraining the water stream in a gas stream so that the water is formed into water droplets of an effective size and the velocity of the water droplets is increased. Enhanced cleaning power at a lower water pressure can be achieved in this way. The '435 reference is directed to a completely different operation totally unrelated to cleaning and does not appear to teach or disclose cleaning as presently claimed.

Claims 1, 5-7, 9-11, 12 and 18 stand rejected under 35 USC § 102(b) as anticipated by Kanno, et al (US 5,934,566). This rejection is traversed.

The '566 patent discloses as method for washing contaminating materials adhering onto a substrate, such as a particulate contaminant formed on the surface of a semiconductor wafer subjected to chemical vapor deposition (CVD) or sputtering. The method is particularly directed to removing small foreign matter of 1 micrometer or less (column 2, lines 55-58). An apparatus for ejecting liquid and gas is described which can form a water jet having droplets having a diameter of from 0.01 micrometers to 1000 micrometers (0.00001mm to 1mm) (see column 6, lines 20-24). However, at column 6, lines 25 -37 it is noted that it is not effective to increase the droplet size beyond 100 micrometer (0.1mm) and that the removal ratio (effect) actually decreases as the drop size is increased beyond 100 micrometers (0.1mm) (see Figure 5 and column 6, lines 35-37). Thus, the '566 patent is believed to teach away from the use of droplets larger than 0.1mm, whereas the present invention prefers the use of relatively large droplets having a median volume diameter of between 0.5 mm to 2 mm (see present claims 1, 20 and 21 and the specification at page 3, lines 25-27 and page 5, lines 22-25).

THE REJECTION UNDER 35 USC § 103

Claims 2 and 8 stand rejected under 35 USC § 103(a) as being unpatentable over Kanno, et al (US 5, 934, 566). The Examiner states that with respect to claim 2, the '566 patent discloses the features of the claimed invention with the exception of the gas and water stream velocity ratio. The Examiner opines that "providing a velocity ratio range of 0.5 to 2 would have been an optimization of the Kanno's functional parameters which is within the knowledge of one of ordinary skill in the art." The Examiner adds "it would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided a velocity ratio range of 0.5 to 2 to optimize cleaning." Similarly with respect to Claim 8 it would have been obvious to provide a water flow rate between 14 to 18 l/min to optimize cleaning.

This ground of rejection is also traversed. For the reasons noted above with respect to the rejection under 35 USC 102 the '566 patent does not disclose the essential features of the present invention

The Examiner states that the reference patent does not disclose the velocities and flow rates of instant Claims 2 and 8, but fails to acknowledge what it does disclose. The Examiner notes that liquid supply pressures are disclosed at column 5, lines 23-29 and that the effect of pressure and supply amounts on droplet size is discussed at column 5, line 56 through column 6, line 24. However the Examiner fails to acknowledge the only disclosure applicants can find of actual flow rates employed at column 7, lines 25 – 27. This discloses a liquid flow rate of 2 liters/min and a gas flow rate of 300 liters/min. This provides water droplet velocities through the orifices which range from 1.8 mm to 6.35 mm (column 7, lines 18-23) is the sonic velocity of 334 m/sec (column 7, lines 27-30), the highest velocity contemplated in the patent (column 5, lines 65-67). Thus, given the constraints on orifice size and velocity it would seem to be unlikely that flow rates 10 times higher than disclosed are contemplated contrary to the Examiner's opinion. If there is basis for the Examiner's opinion applicants respectfully request where this can be found. While gas and liquid flow rates are found in the passages cited above, there does not appear to be any mention of liquid and gas velocity or the ratio thereof as claimed in Claim 2. It is noted that the gas flow rate is approximately 150 times the liquid flow rate in the cited passage and is within the range included in Claims 9 and 10, however, as noted above, the reference does not teach the basic features of Claim 1 (e.g. large droplet size), from which these claims depend, as discussed above.

It is believed that up on reconsideration all of the claims will be seen to be in compliance with 35 USC § 112 and neither anticipated by, nor unpatentable over, the cited references taken alone or in any combination. Early and favorable consideration is respectfully requested.

In view of the foregoing amendments and remarks, this application is believed to be in condition for allowance. If for any reason it is not in such condition, the Examiner is respectfully requested to call Applicants' attorney for a telephone interview.

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Examiner Christopher S. Kim
Art Unit No.: 3752
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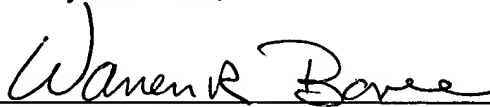
Atty. Docket No.: C-7547-US

The Commissioner is hereby authorized to charge any fees which may be due, or to credit any overpayments made, to Deposit Account No. 50-0231.

Respectfully submitted,

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By:



Warren R. Bovee

Registration No. 26,434

JohnsonDiversey, Inc.
8310 16th Street – M/S 509
P.O. Box 902
Sturtevant, Wisconsin 53177
Direct Phone: 262-631-4196
Fax: 262-631-4021